

SET-‘B’
B.Sc. Life Sciences (Sem II)
Paper Title: Plant Ecology and Taxonomy
UPC: 42161201

Department Code: 216

Time: 3 Hours + 1 hour

Maximum Marks: 75

(Write your University Roll Number and Paper Title & Code on top of the Answer Sheet) *Attempt any four questions in all. All questions carry equal marks.*

1. Differentiate between the two basic types of biogeochemical cycles. Diagrammatically represent Nitrogen Cycling in nature. Explain how have humans affected the carbon-cycling?
2. Give an account of some analytical characters studied by you for understanding communities. What is an edge effect? What are pioneers and how are these different from climax communities?
3. Explain how the flow of energy takes place in ecosystems. Discuss the types of food chains operating in tropical forests? What are the limitations of ecological pyramids?
4. Name any four famous Botanical Gardens of India. Discuss any ONE in detail. Prepare a box-in-box hierarchical presentation for the species *Solanum nigrum*.
5. Describe the steps involved in the classification of taxa using numerical taxonomy. Enumerate the differences between phenogram and cladogram.
6. Outline the system of classification given in Genera Plantarum. What are taxonomic keys? Enumerate the differences between bracketed and indented keys. What is OTU?

Mode of Examination: Open Book Examination

Unique Paper Code : 42231202_OC
Name of the Paper : Comparative Anatomy and Developmental Biology of Vertebrates
Name of the Course: B.Sc. (P) Life Sciences
Semester : II, CBCS
Duration : 3 hours
Maximum Marks : 75

Instruction for Students

Write your Roll No., Name of the paper, Course, Semester, and Date of examination on the first page of answer sheet.

Attempt **ANY FOUR** questions. All questions carry equal marks.

Q1 Explain the succession of kidney in vertebrates. (18.75)

Q2 Describe the structure of alimentary canal in fishes. (18.75)

Q3 Give a comparative description of reptilian and avian brain with help of diagrams. (18.75)

Q4. Explain the process of female gamete formation in animals. What are different basis to classify of female gametes. (18.75)

Q5 Discuss the blocking mechanism to polyspermy in animals. Define stem cells. Explain types of stem cells and their various applications. (18.75)

Q6 Discuss the amphibian metamorphosis. Explain the hormonal control of metamorphosis. Elaborate the steps involved in In-vitro fertilization (IVF). (18.75)

Unique Paper Code : 42164401

Name of the Course : B.Sc. Life Sciences

Name of the Paper : Plant Physiology and Metabolism

Semester : IV

Time: 3 Hours +1 hour

Maximum Marks: 75

Attempt any four questions. All questions carry equal marks (18.75).

1. Explain the process of ascent of sap in xylem. Briefly discuss the factors affecting the rate of transpiration. Differentiate between transpiration and guttation.
2. Describe the pathway of photoassimilate translocation with experimental evidences. What is the composition of phloem sap? With the help of well labelled diagram explain phloem loading and unloading.
3. Compare C₃, C₄ and CAM pathways of carbon fixation. What is the significance of photorespiration?
4. With the help of schematic diagram describe the process of oxidation of glucose in glycolysis and TCA cycle.
5. Give a detailed account of discovery and physiological roles of auxins and gibberellins.
6. Write a short note on phytochrome discovery, structure and its role in controlling physiological responses.

SET-C
B.Sc. Life Science/ Sem VI
(Paper Title: Economic Botany and Biotechnology)
Unique Paper Code: 42167901

Department Code: 216

C.No: DSE

Time: 3 Hours +1 hour

Maximum Marks: 75

(Write your University Roll Number and Paper Title & Code on top of the
Answer Sheet)

Attempt any four questions in all. All questions carry equal marks.

1. Give a detailed account of the concept of Centres of Origin of crop plants. Name some research centres associated with the improvement of rice and wheat. How are grain millets different from cereal crops? How can millets help in tackling food insecurity issues in India?
2. What are natural fibres. What are the various types of plant fibres? Write the botanical names of some tropical legumes grown in semi-arid regions of India. Write a short note on economic uses of Soybean and Gram.
3. Draw well labelled diagrams of V.S Tea leaf and L.S of Clove bud. What is the difference between lint and fuzz? Give the methods of production of mercerized and non-absorbent cotton and list their economic uses.
4. What is ELISA? Mention the techniques and approaches that are presently used to produce monoclonal antibodies. Mention the names of the states where *Bt*-cotton is grown and discuss the advantages of *Bt*-cotton to farmers and industrialists.
5. How are aseptic conditions maintained in Plant Tissue Culture laboratories? Give the composition of any nutrient media used for micropropagation. What are synthetic seeds? Give their potential applications.
6. PCR techniques are important in detection of infections. Why is this test used for detection of Corona Virus infection and how is it conducted? Discuss its advantages and limitations.

SET-B
B.Sc. Life Science/ Sem VI
(Paper Title: Economic Botany and Biotechnology)
Unique Paper Code: 42167901

Department Code: 216
Time: 3 Hours+ 1hour

C.No: DSE
Maximum Marks: 75

(Write your University Roll Number and Paper Title & Code on top of the Answer Sheet)

Attempt any four questions in all. All questions carry equal marks.

1. 'Spices have played an important role in shaping the history and economy of our country'. Justify the statement. Choose any two spices (one from Piperaceae and one from Myrtaceae family) and give their common names, botanical names, botany of the part used and list their medicinal and economic uses. Draw well labelled diagrams of both the spices.
2. What are non-alcoholic beverages? Mention the botanical names of the plants, their families and the parts used for making such beverages. Give a detailed account of areas and method of cultivation, active components, processing and uses of any one non-alcoholic beverage consumed most in our country.
3. List the differences between vegetable oils and essential oils. Write a short note on fatty oils and give botanical names and families of some common fatty oil producing plants. Describe the extraction methods and commercial uses of Groundnut.
4. Diseases caused by nutritional deficiency can be overcome by using food and food products developed using Recombinant DNA Technology and transgenic technologies. Explain the technique in detail using Golden Rice and GM Potato as examples.
5. Discuss the infrastructure and equipment requirements for setting up a Plant Tissue Culture Laboratory. How do we grow triploid plants and why are triploids considered important in floriculture and horticulture?
6. Discuss the role of any three gene cloning vectors. What is Southern Blotting? With the help of suitable diagrams explain the technique and give the applications.

B. Sc. Life Sciences / Semester : IV

Title of paper: Medicinal Botany (SEC)

Unique Code : 32163404

Duration : 2 Hours + 1 hour

Maximum Marks : 38

Write your Roll No., Name of the Paper, Course, Semester and Date of examination on the first page of the answer sheet.

Attempt ANY FOUR questions. All questions carry equal marks

1. What do you understand by traditional system of medicine. Discuss the origin and various concepts of Ayurveda system of medicine?
2. What are polyherbal formulations? Give the names of plants used in the treatment of blood pressure and cancer.
3. What is Pharmacognosy? Explain the Organoleptic method of drug evaluation.
4. What are Endemic species? Discuss various strategies employed for the conservation of Endemic medicinal plants in India?
5. What is a Nursery? Explain the objectives and the important components of a nursery.
6. Explain the role of AYUSH and NMPB in the promotion of medicinal plants.?



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B.Sc. Life Sciences / Semester : VI

Title of paper: Intellectual Property Rights (SEC)

Unique Code : 42163601

Duration : 2 Hours + 1 hour

Maximum Marks : 38

(Write your University Roll Number and Paper Title & Code on top of the Answer Sheet)

Attempt any four questions in all. All questions carry equal marks 9.5 Marks).

1. Discuss the role of judiciary, police and customs in enforcement of IPR. What are the various types of Infringement in IPR management? Explain the preventive measures and legal remedies available for IPR infringements. (9.5 Marks)
2. What is a Copyright? List the types of work protected under Copyright Act, citing examples. Differentiate between Copyright and Patent? (9.5 Marks)
3. Differentiate between Trademarks and Geographical Indications (GI) on the basis of features, ownership and protection as described under IPR laws. Explain the different types of Trademarks with the help of examples. How is “infringement” different from “passing off”? (9.5 Marks)
4. Explain the legal provisions for licensing and technology transfer in India? Which areas benefit from technology transfer? How is technology transferred in biomedicine sector? (9.5 Marks)
5. What is an Industrial Design and how can it be registered in India? How is IPR important for protection of layout-designs of integrated circuits? Discuss the conditions for their registration. (9.5 Marks)
6. What is a Trade Secret? Explain its industrial relevance? Discuss the risks involved in and the legal aspects of trade secret protection. (9.5 Marks)

Unique Paper Code	:	42177926
Name of the Paper	:	DSE Organometallics, Bio-inorganic Chemistry, Polynuclear Hydrocarbons and UV, IR Spectroscopy
Name of the Course	:	B.Sc. (Prog.) Life Science/ Physical Science/ Analytical Chemistry/ Industrial Chemistry
Semester	:	VI
Duration	:	3 Hours
Maximum Marks	:	75

Instructions for the candidate:

(i) Attempt two questions each from Section A and Section B

(ii) All questions carry equal marks.

(iii) Attempt each section separately

SECTION A

- 1.a) Draw structure of the Zeise's salt and mention in which class of compounds will you place it?
- b) Arrange the following species in their decreasing CO stretching vibrational frequencies and explain the reason:
 - (i) $\text{V}(\text{CO})_6^-$, $\text{Cr}(\text{CO})_6$, $\text{Fe}(\text{CO})_6^{2-}$
 - (ii) $[\text{Mn}(\text{CO})_6]^+$, $[\text{V}(\text{CO})_6]^-$, $\text{Cr}(\text{CO})_6$
- c) Explain with the help of a suitable diagram the working of sodium potassium pump in the human body. What is the source of energy for the functioning of this pump?
- d) How is sodium nitroprusside prepared? How does it react with:
alkali metal sulfides, alkali metal sulfites and silver nitrate solution?

(0.75,6,6,6)

2. a) Using the 18 electron rule as a guide find **m** and **n** in



- b) Give balanced chemical equation for the following:

- (i) Potassium ferrocyanide is added to copper sulphate solution.
- (ii) Potassium dichromate is treated with lead nitrate solution.

(iii) Potassium iodide reacts with moderately alkaline potassium Permanganate solution.

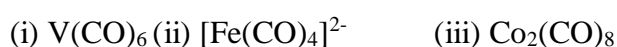
(iv) Potassium ferrocyanide is treated with concentrated sulfuric acid.

(v) Potassium ferrocyanide is treated with ferric salts.

(vi) SO₂ gas is passed through acidic K₂Cr₂O₇ solution.

c) How is iron transferred from storage sites to the sites for incorporation in haemoglobin? Inability to synthesize transferrin may result in anaemia as well as overload of iron. Explain.

d) State effective atomic number rule. What are effective atomic numbers of the metal atoms in



(0.75,6,6,6)

3. a) Name the metal involved in following metalloproteins.

(i) Transferrin

(ii) Chlorophyll

(iii) Myoglobin

b) Discuss the behaviour of CO as strong π acid ligand with the help of molecular orbital diagram.

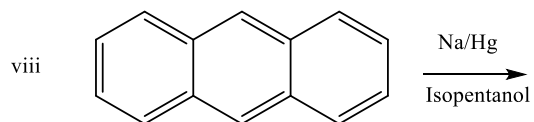
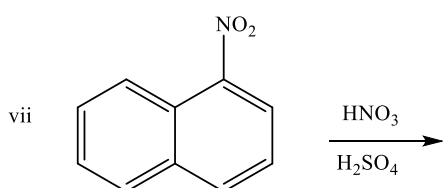
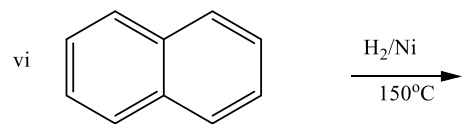
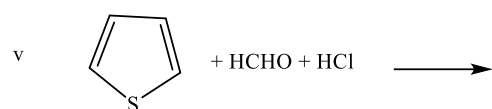
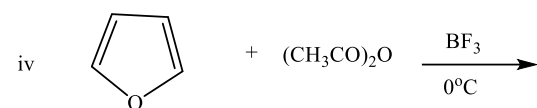
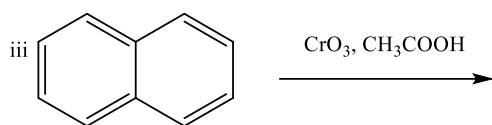
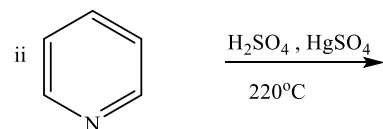
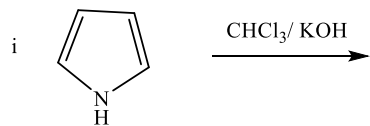
c) Draw structures of CrO₄⁻ and Cr₂O₇²⁻? Write ionic equations for inter conversion of CrO₄⁻ and Cr₂O₇²⁻ in acidic as well as alkaline medium.

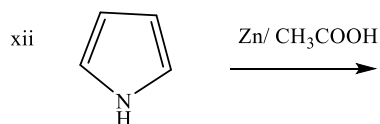
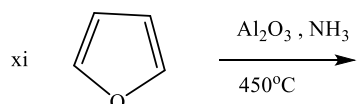
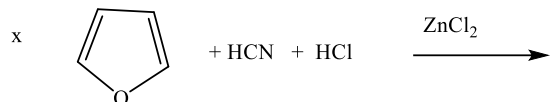
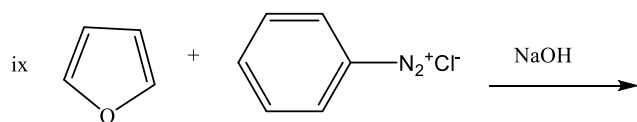
d) What are the functions of haemoglobin and myoglobin? What changes occur in the heme groups of hemoglobin on going from deoxy to oxy form?

(0.75,6,6,6)

SECTION B

4.a) Complete the following reactions:





- b) Nucleophilic substitution reactions takes place more readily in pyridine ring as compared to benzene ring.

OR

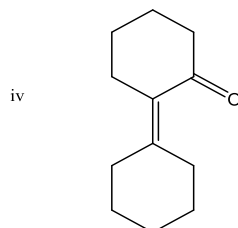
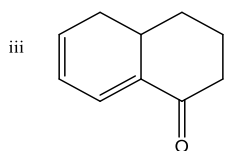
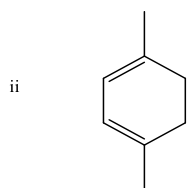
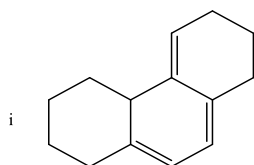
Arrange furan, thiophene and pyrrole in increasing order of aromatic character. Give reason for your answer.

- c) How will you show that naphthalene molecule consists of two benzene rings fused together at ortho positions. Give reactions involved.
- d) State weather the following statement is true or false

The C1-C2 bond length in naphthalene is longer than C2-C3 bond length.

(12, 3, 3, 0.75)

- 5.a) Calculate the λ_{\max} of the following compounds using Woodward-Fieser rules.



Use the following data for calculation

- i) Parent Six membered ring ketone = 215 nm
- ii) Parent acyclic diene = 217 nm
- iii) Parent Heteroannular diene = 214 nm
- iv) Parent Homoannular diene = 253 nm

b) How will you distinguish between the following pairs of compounds using IR Spectroscopy. (ANY 2)

- (i) Propanal and Acetone
 - (ii) o-hydroxy benzoic acid and p-hydroxy benzoic acid
 - (iii) cis and trans Cinnamic acid
- c) "Increase in polarity of the solvent shifts π - π^* band to longer wavelength but n- π^* to short wavelength." Comment on the statement.
- d) Arrange the following molecules in increasing order of carbonyl group absorption frequency
- (i) p-amino acetophenone
 - (ii) p-nitro acetophenone
 - (iii) p-methoxy acetophenone

(10, 4, 3, 1.75)

6.a) Prepare the following organic compounds using ethylacetoacetate (ANY 3)

- (i) 3-Methyl-2-pentanone
- (ii) Succinic acid
- (iii) n-Butyric acid
- (iv) Methyl ethyl ketone

- b) Pyridine on nitration gives mainly 3-nitropyridine but on treatment with NaNH_2 , 2-aminopyridine is obtained. Explain.
- c) Account for the formation of 1-naphthalene sulphonic acid at low temperature and 2-naphthalenesulphonic acid at high temperature.
- d) The U.V Spectrum of acetone shows the peaks at
- (i) $\lambda_{\text{max}} = 280 \text{ nm}$ $\epsilon_{\text{max}} = 15$
- (ii) $\lambda_{\text{max}} = 190 \text{ nm}$ $\epsilon_{\text{max}} = 100$
- Form the data given above identify
- (i) The electronic transition for each
- (ii) Which is more intense and why?
- e) Write stepwise synthesis of naphthalene using Haworth's method.
- f) Define the term bathochromic shift and what structural feature may produce a bathochromic shift.

(9, 2, 2, 2, 2, 1.75)

Mode of Examination: Open Book Examination

Unique Paper Code	:	42237904
Name of the Paper	:	Immunology
Name of the Course	:	B.Sc. (P) Life Sciences Examination, 2021
Semester	:	VI, CBCS (DSE)
Duration	:	3 Hours
Maximum Marks	:	75

Instructions for Students

Write your Roll No., Name of the paper, Course, Semester, and Date of examination on the first page of answer sheet.

Attempt **ANY FOUR** questions. All questions carry equal marks.

Substantiate your answer with diagrams wherever necessary

Q1. Assess the statement, "All immunogens are antigens but not all antigens are immunogens" with suitable examples and highlight the immunogenic properties of molecules. Explain B and T-Cell epitopes. 18.75

Q2. Many of the effector functions of immunoglobulin are brought about with the help of various cells and molecule. Describe 3 such functions involving complement activation, opsonization and ADCC. 18.75

Q3. Cytokines are mainly secreted by TH cells in response to antigen stimulation. Describe the pathway by which antigen presenting cells process and present antigen to TH cell. Describe how specificity is maintained in resulting cytokine response. 18.75

Q4. There are several cells that cooperate in immune system. Describe the cells that are responsible for innate and adaptive immune response and how they cooperate with each other. 18.75

Q5. Many autoimmune diseases involve hypersensitivity reactions of the humoral branch of immune system. Describe these hypersensitivity reactions with suitable autoimmune diseases examples. 18.75

Q6. A bacterial protein that can confer protective immunity against the pathogenic bacteria can be used for vaccination in various formats. The gene for that protein can be cloned and expressed, yielding a recombinant protein to be used as vaccine. That gene can also be used in a recombinant vector vaccine or a DNA Vaccine. Describe all these vaccine types with their advantages and disadvantages. 18.75